

PATENT SPECIFICATION



Application Date : Nov. 28, 1919. No. 29,665/19.

152,233

Complete Left : Mar. 26, 1920.

Complete Accepted : Oct. 14, 1920.

PROVISIONAL SPECIFICATION.

Improvements in Aerial Propellers, Fans, and the like.

I, SIDNEY HERBERT HOLLANDS, of 11, Boundary Road, Wood Green, London, N. 22, Engineer, do hereby declare the nature of this invention to be as follows:—

struction, while conducing to very high efficiency, are found to lend themselves admirably to strength and rigidity combined with a minimum of weight.

ERRATUM.

SPECIFICATION No. 152,233

Page 1, lines 37 and 38, *for*, "aerial-flow aerial-moving fans" *read*
"axial-flow air-moving fans"

PATENT OFFICE,
November 5th 1920.

25 The foregoing special design and con-

SIDNEY H. HOLLANDS.

COMPLETE SPECIFICATION.

Improvements in Aerial Propellers, Fans, and the like.

I, SIDNEY HERBERT HOLLANDS, of 11, Boundary Road, Wood Green, London, N. 22, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

35 My invention relates to an improved type of propeller for aerial machines, applicable also to aerial-flow, aerial-moving fans for all such purposes, also to wind-motors.

[Price 1/-]

These are of specially light, rigid and strong construction, made wholly of thin sheet steel preferably, although other metals may be used either wholly or in part.

These have blades—preferably two—of tapered width, being widest at the root, and narrowest at the tip, of irregular crescent shape in cross section, the rear or driving side being concave, but having a ridge along the length of its leading edge, with a bluff entry. The blades are

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I, SIDNEY HERBERT HOLLANDS, of 11, Boundary Road, Wood Green, London, N. 22, Engineer, do hereby declare the nature of this invention to be as follows:—

- 5 Improvements in aerial propellers and tractors for aircraft; applicable also to fans for air-propelling and to wind-motors, or other uses. These are of specially light, strong, and rigid construction, preferably of thin sheet steel, 10 having two blades, preferably, of tapered width, wide at root, and narrow at tip; of irregular crescent shape in cross-section, and "stream-lined". The front and 15 rear surfaces being respectively convex and concave, the latter being a flatter curve, and having a longitudinal ridge at the leading edge. The blades are set at a rearward "rake", or "lay-back", to 20 the axis, and at pitch-angles of maximum efficiency at root, mid-length and tip, predetermined by accurate comparative experiment. The blades are efficiently stayed to a long main central boss.
- 25 The foregoing special design and con-

struction, while conducing to very high 40 efficiency, are found to lend themselves admirably to strength and rigidity combined with a minimum of weight.

Other metals than steel, or suitable alloys may be used in construction, either 45 wholly or in part.

This form and arrangement of tapered, broad-rooted blades, also gives reduced radii of centres of pressure and of mass, thereby reducing centrifugal, tensile, and 50 racking stresses, necessary driving torque, meaning economy of power, applied, and eliminates ineffective resistance to rotation (*i.e.* dead resistance, or waste of, 55 driving power).

The foregoing several conditions are thus attained, besides producing a propeller, fan, or wind-motor in which the essential features are in perfect harmony with increased structural strength and 60 reduced weight.

Dated this 27th day of November, 1919.

SIDNEY H. HOLLANDS.

COMPLETE SPECIFICATION.

Improvements in Aerial Propellers, Fans, and the like.

- I, SIDNEY HERBERT HOLLANDS, of 11, Boundary Road, Wood Green, London, 30 N. 22, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 35 My invention relates to an improved type of propeller for aerial machines, applicable also to aerial-flow, aerial-moving fans for all such purposes, also to wind-motors.

[Price 1/-]

These are of specially light, rigid and strong construction, made wholly of thin 65 sheet steel preferably, although other metals may be used either wholly or in part.

These have blades—preferably two—of tapered width, being widest at the root, 70 and narrowest at the tip, of irregular crescent shape in cross section, the rear or driving side being concave, but having a ridge along the length of its leading edge, with a bluff entry. The blades are 75

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set at a rearward "rake" or "lay-back", of about twelve degrees with the plane of motion, and at pitch angles of maximum efficiency, *i.e.* of 30° , $22\frac{1}{2}^\circ$, & 15° at root, mid-length & tip respectively.

All of these conditions have been determined by careful comparative experiment, and efficiency testing.

The blades being hollow, are further—
10 and neatly reinforced internally, and preferably built-up of two or more thin sheets suitably bent or pressed to the correct curvature, and the seams being preferably either acetylene-welded or brazed-up.

15 In order that this invention may be more clearly understood, it will now be described with reference to the accompanying drawings wherein:—

20 Fig. 1 is a front elevation of the entire propeller or fan.

Fig. 2 is a side elevation of the same.

Fig. 3 is a plan of the same.

25 Figs. 4, 5 & 6 are enlarged cross sections at root, mid-length and tip of blade respectively, showing pitch-angles "P" of 30° , $22\frac{1}{2}^\circ$ & 15° .

"D" in Figs. 4, 5, & 6 show relative depth of concavity of blades.

30 "S" in Figs. 1, 2, & 3 are tension stays to the blades.

This invention conduces to a very high efficiency due to the foregoing special features, including exceeding lightness

and rigidity with adequate strength and a good factor of safety.

I am aware that it has been proposed to make aeropropeller blades concavo-convex in cross section, but not of the special section I describe and claim, also that it has been proposed to give them a rearward "rake", or "lay-back", but at no stated angle—such as I describe and claim—an essential feature.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. In an aerial propeller, or screw fan, blades of the cross-sections shown on the accompanying drawings and described.

2. In an aerial propeller, or screw-fan, narrow tipped blades, as described and shown on the accompanying drawings.

3. In an aerial propeller, or screw-fan, blades set with a rearward "rake", or "lay-back" of about twelve degrees with the plane of motion.

4. In an aerial-propeller, or screw-fan, blades set to pitch-angles of maximum efficiency, *i.e.* 30° , $22\frac{1}{2}^\circ$, and 15° at root, mid-length, and tip respectively.

Dated this 26th day of March, 1920.

SIDNEY H. HOLLANDS.

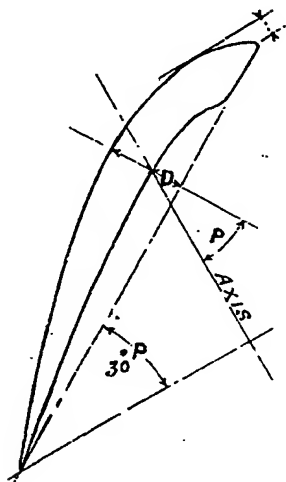


FIG. 4.

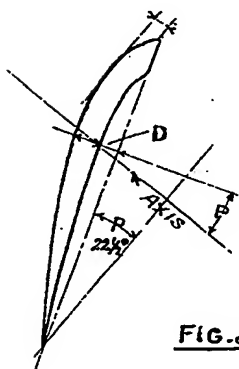


FIG. 5.

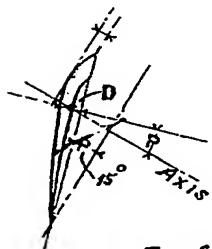


FIG. 6.

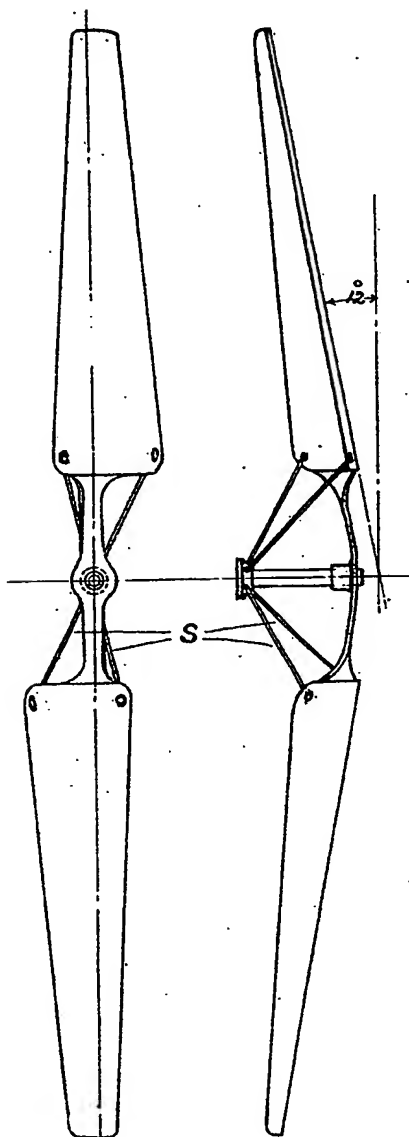


FIG. 1.

FIG. 2.

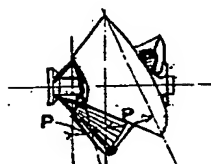


FIG. 3.